

The Effect of Student Teams Achievement Division (STAD) And Animation As Media on Indonesian Students' Physics Achievement

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Abstract: This research aimed to investigate students' Physics achievement through implementing STAD (Student Teams Achievement Division) derived from cooperative learning with animation as media. The population of the research was grade XII students of senior high school MAS TPI Rambung Sialang, North Sumatera Indonesia, then two classes were chosen as sample of the research in which there were 30 students for each of class. To meet the objectives of the research, quantitative research method with experimental research design was conducted, then, the instrument of the research was comprehensive multiple choice with 20 questions formulated. Through Lilefors test with $L_0 < L = 0.1384 < 0.1610$, it showed that all the data were distributed normally, then, all the data were distributed homogenously as well with $F_{\text{observed}} < F_{\text{table}} (1.191 < 1.858)$. Moreover, based on data analysis it was found that the average score of experimental class I taught by implementing STAD (Student Teams Achievement Division) with animation as media was higher with $\bar{X}_A = 14.9$ than experimental class II taught by conventional model with $\bar{X}_A = 12.5$. Furthermore t_{test} was used to analyzed the data found with $t_{\text{observed}} > t_{\text{table}} (2.654 > 1.671)$ that showed that there was a significant effect on students' Physics achievement taught by implementing STAD (Student Teams Achievement Division) with animation. Based on data analysis, it could be inferred that students definitely enjoy studying in group discussion that was organized by the teacher in which the members of group consisted of student with different intelligence level so that there would be an interaction among students accross capabilities level. The students with higher intelligence were expected to assist the students with lower intelligence, then students with higher intelligence that were recognized as an expert representative from each group would have a great an opportunity to share the discussion result with other groups. Besides, the use of animation as media brought up functionally and lively understandable objects, concepts, and formulas. Hence, all the abstract concepts seemed to be effortlessly more concrete for the students

Keywords: STAD (Student Teams Achievement Division), Animation, Media, Physics Achievement.

INTRODUCTION

It is believed that science education will offer multiple benefits for technological development in this current rapid digital age. One of science education affecting to the knowledge and technology advancements is Physics education that absolutely can create the new-fashioned science industries and dicoveries. Based on this urgency, Physics education is urgently needed by the students in order to let the students be close to the science notions. Yet, enhancing students' science achievement in primary school in Indonesia is one of the challenging teaching learning objectives faced by both teachers and students due to the difficulty levels related to patterns, numbers, and logics that are too complicated for some students.

Based on the observation conducted during teaching learning process in senior high school of MAS TPI Rambung Sialang, it showed that grade XII students' Physics achievement was extremely low in which more than 50% student were failed. There were three factors found from the interview undertaken by the researchers with some students post teaching learning process, such as; the students were not interested in studying Physics, the students were hard to understand the patterns, and the students were not able to relate Physics materials taught with the real life. Indeed, the way of teachers deliver the materials determine the students' physics achievement in which the teacher was suggested to familiarize the students with the Physics materials slowly through implementing the appropriate teaching models.

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Alternativley, the implementation of STAD (Student Teams Achievement Division) derived from cooperative learning was highly expected to affect students' Physics achievement as this model allows the students to work with group and to think of all the Physics concepts more simply than before. Moreover, to achieve a fruitful learning objective, the implementation of STAD (Student Teams Achievement Division) would be applied with the use of animation as media since it aimed to catch the students' interest fast.

Slavin [1] pointed out that STAD (Student Teams Achievement Division) a teaching model that divides the students into group in which there will be 4 to 5 students discussing the materials explained by the teacher in advance, then the students are asked to complete the test together with members of group, last, the score given will determine individual score. Furthermore, Zubaedi [2] stated that the implementation of STAD (Student Teams Achievement Division) in the classroom must be following the syntaxis in order. Firstly, the teacher delivers the objectives of learning that have to be achieved and motivates the students to be more active in following Physics classroom activities taught by STAD (Student Teams Achievement Division). Secondly, the teacher deliver the Pyhsics materials to the students by using either demonstration method or reading text. Thirdly, the teacher organize the students' group discussion in which the students are guided to divide into some well-ordered groups that work together to complete all the task so the students will achieve the learning outcoomes. Fourthly, the teacher keeps guiding the students during task completion, for instance; teacher gets into the group either for checking the students' work or for giving some explanation needed by the students. Fiftly, the students' understanding about the materials is evaluated through classroom presentation or discussion among other groups. Sixthly, reward is required for groups that are completely successful in carrying out the task. Overall, all students' participation will lead to the students' Physics achievement.

Besides, according to Shoimin [3] stated that STAD (Student Teams Achievement Division) has strenghts and weaknesses that give an impact to the teaching learning process. The strenght of STAD (Student Teams Achievement Division) that significantly affect on students' Physics achievement namely; a) the students are allowed to work with group, b) the students motivate and assist each other, c) there will be an interaction across students' intelligence levels in which students with lower capability will be assisted by other students, d) the students have an opportunity to develop their communication skill through sharing session, and e) the students are in the same position with the same purposes in which there is no competiton. While, the weaknesses always come to pass as well, namely; a) the students with lower capability have a less contribution in group discussion, they tend to be passive students who listen more than speak, b) there will be strongly tight discussion in developing the materials given between students with middle capability and students with higher capability, c) the curriculum objectives can not be achieved completely because insufficient allocation time, and d) the implementation of STAD (Student Teams Achievement Division) is required a teacher with higher classroom management capability. Briefly, the implementation of STAD (Student Teams Achievement Division) definetly create the innovative and fun learning in which the students are allowed to participate among other students across capability level so that the students will interact, assist and motivate among others.

Furthermore, the use of media in teaching learning process certainly both facilitate students and teachers in carrying out the aims of Physics learning. According to Sudarwan [4] stated that media in education is an entire teaching aid that is used by teacher during delivering the materials in order to communicate with students easily, hence, media in teaching aid such; object, picture, graph, or video, while, the way teacher use the media called as communication among teacher, students, and teaching aids. Then, according to Istarani and Intan [5], media in learning process is an entire elements that are used to deliver both materials and information so that the students more pay a close attention following classroom activities.

In this research, the media used is animation, the term animation derives from "to animate" which means moving object, and to move the objecct. According to Nasution [6] animation is kind of electronic digital media that transfer some elements into computer technology and results in a moving object that work digitally. Usually, media works together with computers, and softwares, such as; macromedia flash, microsoft power point, camtasia studio, and etc. The use of animation as teaching aid is an appropriate media for presentation since animation will easily attract students' attention then the materials will be understood by the students fast. There are five strengths of using animation as media in Physics teaching learning process, namely; a) the movement can be showed effectively, b) animation changes abstract concept into concrete object, c) animation simply describes difficult materials, d) picture, obejct or video can be adjusted, and e) animation create an interativey flexible classroom, and f) cost effeectiveness. Besides, animation as media also comes up with the strength, such as; a) it only works for computrized program, b) an entire multimedia is required, c) animation must be created by professional teams, d) animation making takes a lot of time.

To meet the Physics teachers' capacity and students' need in Pyhsics learning process, the researcher will use microsoft power point completed with the interesting slides, clip arts, and presentation outlines to attract the student's attention. According to Macdoms [7] pointed out that to create a functionally and lively presentation, the slide may be added with the animation effects in each slide made. In short, the animation using in the classroom have some benefits,

namely; to stimulate the students to understand the science concepts, to give students an opportunity to think creatively, and to allow the students to analyze and to calculate.

RESEARCH METHODS

This research was carried out in senior high school of MAS TPI Rambung Sialang, North Sumatera Indonesia. The population of the research was grade XII students, the two classes were chosen as the sample of the research by applying random purposive sampling. To meet the objectives of the research, quantitative research method with experimental research design in which experimental class I was taught by implementing STAD (Student Teams Achievement Division) with animation as media, while experimental class II was taught by using conventional teaching model in order to investigate whether there was a significant effect on students' Physics achievement taught by implementing STAD (Student Teams Achievement Division) with the animation as media. In details, the research design was visualized in figure-1.

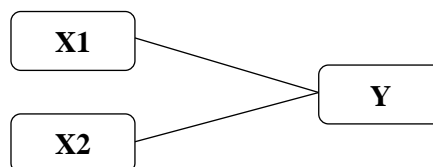


Fig-1: Research design

Explanations:

X₁ = Experimental class I taught by STAD (Student Teams Achievement Division) with the animation

X₂ = Experimental class II taught by conventional model

Y = Students' Physics achievement

Moreover, the instrument of the research used was a comprehensive test to measure students' Physics achievement, then all the data found were analyzed by t-test

FINDINGS AND DISCUSSION

Prior to hypothesis test, normality test was carried out by applying Lilefors test with $L_0 < L$ in which it was found that $L_0 = 0.1384$ and $L = 0.1610$ with $n = 30$ and $\alpha = 0.05$. Hence, $\text{Sig } 0.1384 < 0.1610$ in which all data were distributed normally (Supardi, 2013). In addition, the data were distributed homogeneously with $F_{\text{observed}} < F_{\text{table}} (1.191 < 1.858)$. Moreover, based on the data found, the differences of average scores between experimental class I and class II were shown in the calculation below.

The experimental class I

a) Score Averages

$$\bar{X} = \frac{\sum f_i X_i}{\sum f_i}$$

$$\bar{X} = \frac{447}{30} = 14,900$$

b) Standard Deviation

$$s = \sqrt{\frac{\sum f_i X_i^2 - \frac{(\sum f_i X_i)^2}{n}}{n - 1}}$$

$$= \sqrt{\frac{(6967,5) - \frac{(447)^2}{30}}{30 - 1}}$$

$$= \sqrt{\frac{(6967,5) - \frac{199809}{30}}{30 - 1}}$$

$$= \sqrt{10,593}$$

$$= 3,255$$

Experimental class II

a) Scor Averages

$$\begin{aligned}\bar{X} &= \frac{\sum f_i X_i}{\sum f_i} \\ &= \frac{377}{30} = 12,567\end{aligned}$$

b) Standard Deviation

$$\begin{aligned}s &= \sqrt{\frac{\sum f_i X_i^2 - \frac{(\sum f_i X_i)^2}{n}}{n - 1}} \\ &= \sqrt{\frac{(5103,5) - \frac{(377)^2}{30}}{30 - 1}} \\ &= \sqrt{\frac{365,9}{29}} \\ &= \sqrt{12,616} = 3,552\end{aligned}$$

Based on the calculation above, it showed that aveages of experimental class I was higher with 14.9 than experimental class II with 12.5, in other words, implementation of STAD (Student Teams Achievement Division) with the animation signigificantly affected on students' Physics achievement. Moreover, the hypothesis was analyzed by using pooled standard deviation and t-test as stated as follows;

$$Pooled\ Standard\ Deviation\ (Sp) = \sqrt{\frac{(n_A - 1)s_A^2 + (n_B - 1)s_B^2}{n_A + n_B - 2}}$$

with $S_A^2 = 10,59$; $S_B^2 = 12,62$; $n_A = 30$; $n_B = 30$, then :

$$\begin{aligned}Sp &= \sqrt{\frac{(30 - 1)(10,593) + ((30 - 1)(12,616)}{30 + 30 - 2}} \\ &= \sqrt{\frac{673,061}{58}} \\ &= \sqrt{11,6045} \\ &= 3,407\end{aligned}$$

Then, t-test was carried out as seen in the following formula:

$$\begin{aligned}t_{\text{observed}} &= \frac{\bar{X}_A - \bar{X}_B}{s_p \sqrt{\left(\frac{1}{n_A} + \frac{1}{n_B}\right)}} \\ &= \frac{(14,900) - (12,567)}{3,407 \sqrt{\left(\frac{1}{30} + \frac{1}{30}\right)}} \\ &= \frac{2,33}{(3,407)(0,258)} \\ &= \frac{2,333}{0,879} \\ &= 2,654\end{aligned}$$

Based on the data above, it was obtained that t_{observed} was 2.654 with $\text{Sig} > 0.05$ and the degree of freedom with $58 = 1.671$ in which it showed that $t_{\text{observed}} > t_{\text{table}}$ ($\text{Sig } 2.654 > 1.671$). Obviously, the data analyzes showed that hypothesis was accepted since the data analysis clearly showed that the implementation of STAD significantly with animation as media affected on students' Physics achievement. Shortly, the students were able to complete the test given satisfyingly as the students understand comprehensively the mateiral after they were treated by STAD with animation.

The data analysis clearly showed that the implementation of STAD (Student Teams Achievement Division) with animation as media affected on how students understand the materials given, eventough the students had different cognitive skills in which some students come up with lower, middle and higher cognitive skills. No matter cognitive skill students had, the students would be divided into some groups equally, the students with different intelligence levels were together not only for discussing the materials, but also assisting each other. Similarly, Shoimin [3] also stated one of the benefits of the STAD implementation (Student Teams Achievement Division) was combining students group discussion accross intelligence levels, in other words, one group consisted of students with lower, middle and higher intelligence levels so that the students with lower intelligence skill were expected to be assisted to understand and to complete the test by students with middle and higher intelligence skill. In this case, students with higher intelligence who were recognized as an expert coming from different groups would have an opportunity to communicate what they had discussed with their own group. Therefore, there would be developing materials that led to the students' Physics achievement. In this case, the teacher played an important role in managing well-ordered groups, and guided the students during dicussion, the teacher tried to solve the groups problem and the teacher kept motivating the students to participate in group dicussion. It was also stated by Zubaedi [2] that concerned with syntaxes deaeling with the implementation of STAD that would be functionally woking in the classroom if the teacher were able to communicate any steps required in STAD. Moreover, the students' interest in studying Physics was being raised by using animation media as well. It was also found by Nasution [8] who revealed that students' attention were easily approached by showing animation as the students would be more joyful if they saw moving digital objects, pictures and graphs. Studyng Physics with complicated formulas, numbers, logics, concepts, and abstracts became more concrete to understand so that the students could think more logically.

CONCLUSION

Based on finding of the research, this research concluded that students taught by implementing STAD (Student Teams Achievement Division) with animation media scored higher with the averages 14.9 than students taught by conventional model with 12.5. Then, students' Pyhiscs achievement was also significantly affected by STAD and animation also showed t_{test} that $t_{\text{observed}} > t_{\text{table}}$ (Sig 2.654 > 1.671). In conclusion, there are two benefits of implementing STAD (Student Teams Achievement Division) with animation media, namely; students tend to study Physics in group discussion, students easily understand the formulas, numbers, logics, concepts, and abstracts found in Pyhsics through digital animation.

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